

ELEMENTARY MATHEMATICS.

- (1) *Elementary Solid Geometry, including the Mensuration of the Simpler Solids.* By W. H. Jackson. Pp. xii+159. (London: Edward Arnold, 1907.) Price 2s. 6d.
- (2) *Euclid Simplified in Accordance with the New University Regulations, with Additional Propositions and Numerous Examples.* Fourth edition. By Saradaranjan Ray. Pp. xvi+271. (Calcutta: The City Book Society.) Price 1.8 rupees.
- (3) *A Preliminary Geometry.* By Noel S. Lydon. Pp. iv+108. (London: Methuen and Co., n.d.) Price 1s.
- (4) *Examples in Elementary Mechanics, Practical, Graphical, and Theoretical.* By W. J. Dobbs. Pp. xii+344. (London: Methuen and Co., n.d.) Price 5s.

(1) **T**HE study of three-dimensional geometry is generally more or less neglected in our schools; this excellent text-book should materially help to correct this fault; its effect on the reader is to enhance his sense of the importance and attractive nature of the subject. In part i. the properties of the line and plane and of the simpler curved surfaces are demonstrated with Euclidean rigour, but with a delightful freshness which recent reforms have done so much to encourage. Moreover, the numerous and well-chosen exercises, and the admirable figures and diagrams, are quite a feature of the book. Part ii. deals with the mensuration of solids. It is as effective as before; in style and treatment and in the diagrams and exercises the same high standard is maintained. Prof. Horace Lamb has written an appreciative preface, and there is no book on this branch of mathematics more worthy of adoption in our schools and colleges.

(2) In this geometry, in order to preserve continuity and for convenience of reference, the sequence and indeed the numbering of Euclid's propositions are maintained, while the arrangement is designed to meet the requirements of the new syllabus of geometry for the matriculation examination of the Calcutta University, which will be found very similar to the schedules now prevailing in this country. In re-modelling Euclid according to this scheme, propositions of minor importance are relegated to the exercises, and new propositions are added. The enunciations and proofs are revised and often rewritten. Many exercises are provided. The book will appeal to those who wish to follow the new methods with as little departure from the old as possible, and who are not prepared to accept the reform in its entirety.

(3) This useful little book gives a simple and orderly course of practical geometry for beginners, intended as a preliminary to a formal and deductive study of the subject. The pupil becomes acquainted with the terminology and with the properties of the simpler plane figures, and to some extent is trained to use his reasoning faculties. The author is very successful in carrying out his scheme.

(4) The distinction between theoretical and applied

mechanics is gradually losing its significance, and it is now generally recognised that the subject of mechanics cannot be satisfactorily taught without some amount of experimental and practical work done by the student himself. The present book is written from this point of view; the graduated series of examples, arranged in chapters, are experimental, numerical and graphical, and are accompanied by just sufficient explanation and discussion of principles as, with the guidance of a teacher, will enable the student to dispense with an ordinary text-book. The apparatus used, while effective for its purpose, is of the simplest character, and is for the most part made by the student himself. Statics is fully discussed before dynamics is taken up, a sequence which, we think, is the right one. The conception is good and well worked out, and the book will commend itself to many teachers.

TWO SPECULATIVE CONTRIBUTIONS TO GEOLOGY.

- Die Entstehung der Kontinente, der Vulkane und Gebirge.* By P. O. Köhler. Pp. vi+58; 2 figures. (Leipzig: W. Engelmann, 1908.) Price 1.60 marks.
- Die geologischen Grundlagen der Abstammungslehre.* By G. Steinmann. Pp. ix+284; 172 figures. (Leipzig: W. Engelmann, 1908.) Price 7 marks.

THESE two books have little in common except that they are both German speculative discussions of geological principles. Herr P. O. Köhler's pamphlet on the origin of continents, volcanoes, and mountains is a contribution to dynamical geology, in which he rejects some of the most generally accepted facts in geological morphology, and opposes especially some of the main conclusions of Prof. Suess. The author denies the existence of "Senkungsfelder," or faulted blocks of the earth's crust, and he declares that raised earth blocks—the Schollen of Suess—are statically impossible. Herr Köhler regards plutonic and volcanic intrusions as closely allied, and attaches great weight to the extent of plutonic activity; he describes the views of those whom he calls the "passive plutonists" as erroneous in all important respects, and he traces their errors to two chief fallacies—the secular cooling of the earth and its higher internal temperature.

Prof. Steinmann's book is a bold attempt to re-classify the animal and vegetable kingdoms. He advocates principles which, if not altogether new, have long been out of fashion and lead to startling and incredible results. Twenty years ago Prof. Steinmann was driven to study the bases of the current theory of phylogeny, as it would not fit the facts; and in this volume he gives a most interesting sketch of the history of the subject, followed by a statement of the principles and results obtained by his own long studies. Most palæontologists share Prof. Steinmann's faith in the importance of the historic evidence. The positive records of geology as to the succession of life on the world afford the ultimate test by which all theories of evolution must be judged. A sufficient volume of evidence may not be collected

for several generations, but when it comes its conclusions will have to be accepted, for it consists of the actual facts as to the development of life on the globe. The weight assigned by Steinmann to the value of the historic method is not exaggerated, but his methods of using it are open to question.

He advances two main principles, racial immortality and the primary importance of external characters. He emphatically denies the current belief that whole classes of animals and plants have become extinct. He says groups of animals always survive, though we fail to recognise the connection between successive generations. That organic variation should never have followed unsuitable directions and that there are no dead ends in the tree of life is a startling doctrine. This principle of racial immortality leads Prof. Steinmann to conclusions which are not likely to be generally accepted. The trilobites, according to his views, must have lineal descendants, and he finds that various insects are the progeny of different families of trilobites.

Prof. Steinmann's second principle is equally revolutionary. He holds (p. 119) that "for phylogeny the most significant characters are sculpture and form." Engineers have been driven to give torpedoes shapes which resemble those of some sharks, some Mesozoic marine reptiles and whales. This external similarity is usually regarded as an adaptation to the physical necessities of rapid progress through water; but this homoplastic explanation is rejected by Prof. Steinmann. In accordance with his view that form and sculpture are the best guides to relationships, he maintains that the whales are the direct descendants of Mesozoic reptiles. The numerous characters in which the Cetacea agree with mammals and differ from reptiles Prof. Steinmann dismisses as of secondary importance, and as due to a sort of zoological fashion. He maintains that their external resemblances show that the various Cetacea are derived from various groups of reptiles. The Delphinidæ (dolphins and porpoises), according to Steinmann, are the descendants of the Ichthyosaurians, the sperm whales of the Plesiosaurs, and the whalebone whales of such reptiles as *Clidastes* and *Mosasaurus*. Similarly, he derives the Casuarines from *Ceratosauros*, the Patagonian Miocene bird *Phororhacos* from *Belodon*, and the walrus from *Dinoceras*.

Prof. Steinmann's views as to the relationships of various invertebrates and plants are equally startling. The tunicates he represents ingeniously as shell-less descendants of the Rudistidæ, and the characters believed to connect the ascidians with the ancestors of the invertebrates, he says, are of secondary importance, and have been recently acquired.

Prof. Steinmann has done such valuable work both in palæontology and geology that his views are always entitled to careful consideration; but he must not be surprised if the arguments in his present essay are generally dismissed as unconvincing, for they require the re-classification of both animal and vegetable kingdoms on lines which have been almost unanimously rejected by modern biologists.

J. W. G.

OUR BOOK SHELF.

Das Gebiss des Menschen und der Anthropomorphen. Vergleichend-anatomische Untersuchungen. Zugleich ein Beitrag zur menschlichen Stammgeschichte. By Dr. P. Adloff. Pp. 165; 9 text-figures, 27 plates. (Berlin: Julius Springer, 1908.) Price 15 marks.

THIS excellent book is part of the literature of an arduous if somewhat wordy warfare concerning the genealogy of mankind in general and of that variety in particular known as the "Neanderthal" or "Spy" man which broke out some years ago amongst the anatomists along the Rhine valley, and, as this work shows, is still being carried on with great vigour. The outbreak was really a consequence of the discovery of *Pithecanthropus erectus* by Eugène Dubois in 1894. In the light of that discovery, Prof. Schwalbe, of Strassburg, commenced a critical re-examination of the remains of the Neanderthal-Spy race, and came to the conclusion that they could not be regarded as ancestral to modern Europeans owing to their many physical peculiarities, and that they constituted a species of mankind, to which the name *Homo primigenius* was applied.

Prof. Kollmann, of Basel, slighted the specific marks assigned by Schwalbe to *Homo primigenius*, and set out to find the ancestry of modern man in a race of pygmies, with as yet but little success. Then came the discovery of the Krapina men in Croatia by Gorjanović-Kramberger, with teeth belonging to some ten individuals in excellent preservation, and of a type almost unknown among modern men. While the discoverer regarded the Krapina men as mere variants of modern man, Adloff excludes them from the ancestry of modern Europeans, and gives them the specific name of *Homo antiquus*.

The discussions and the disputes have been widened by the Dutch anatomists, Klaatsch (now in Breslau) and Bolk, of Amsterdam, the first of whom upholds the theory that man and anthropoids have sprung independently from a lemuroid stock, while the second maintains that the old-world apes and monkeys are derived from a stock akin to the South American monkeys. It was to clear up the points in dispute that Dr. Adloff produced the work under review; but it is to be feared their settlement is as far off as ever. Dr. Adloff has made a special study of teeth and has taken much pains to obtain access to all available material. He has described and figured all he has seen with accuracy, and thus produced a work which must prove of the greatest value to all who are investigating the problems connected with the origin of man. The facts will stand, but it is to be feared that most of the author's inferences are not of an abiding value. The discussion has scarcely received the attention it deserves in England; the present position of matters may be gleaned from this work.

A. K.

The Hope Reports. Vol. vi. (1906-8). Edited by Prof. E. B. Poulton, F.R.S. (Oxford: Printed for private circulation by H. Hart, 1908.)

THE memoirs contained in the bulky sixth volume of the Hope Reports were published separately in the course of the two years from June, 1906, to June, 1908. They bear eloquent witness to the quantity and quality of work which is being turned out by the Hope Department of Zoology in the University of Oxford. The first ten memoirs are chiefly or wholly concerned with bionomic subjects—e.g. particular cases of mimicry sometimes studied on the spot, the recent developments in the theory of mimicry, experiments on seasonally dimorphic forms, the natural